CLAIMS

What is claimed is:

1. A computer-implemented method for managing access to objects by clients in a distributed file system including a storage server arrangement and a meta-data server, comprising:

    managing leases on the objects at the meta-data server;

    transmitting lease expiration data from the clients to the storage server arrangement along with storage access requests, the lease expiration data indicating a lease expiration time;

    comparing at the storage server arrangement the lease expiration data to data indicating a current time; and

    denying access to the object if the lease expiration time is earlier than a current time.

2. The method of claim 1, further comprising transmitting lease requests from the clients to the meta-data server, each lease request including an object identifier and a requested lease duration.

3. The method of claim 2, further comprising for each lease granted, returning data to a requesting client indicating a time at which the lease began and a duration of the lease.

4. The method of claim 3, further comprising computing lease expiration times at the clients in response to leases granted, wherein the lease expiration data specify the lease expiration times.

5. The method of claim 1, further comprising computing lease expiration times at the meta-data server, and transmitting data indicating the lease expiration times from the meta-data server to the clients.

1   6.   A computer-implemented method for managing access to file data in a

2   distributed file system including a storage server arrangement, a meta-data server, and a

3   plurality of clients comprising:

4   submitting a lease request from a client to the meta-data server, the lease request

5   referencing an object in the distributed file system;

6   when the object becomes available for lease, designating the object as leased to

7   the client and transmitting a lease response to the client, the lease response including

8   data that indicate a lease expiration time;

9   transmitting a storage access request referencing the object from the client to the

10   storage server arrangement, the storage access request including data that indicate the

11   lease expiration time; and

12   denying access to the object if the lease expiration time is earlier than a current

13   time.

1   7.   The method of claim 6, wherein the lease request includes an object identifier

2   and a requested lease duration.

1   8.   The method of claim 7, wherein the data indicating the lease expiration time

2   describes a time at which the lease began and a duration of the lease.

1   9.   The method of claim 8, further comprising computing the lease expiration time

2   at the client from the lease response.

1   10.   The method of claim 6, further comprising computing the lease expiration time

2   at the meta-data server.

1   11.   An apparatus for managing access to objects by clients in a distributed file

2   system including a storage server arrangement and a meta-data server, comprising:

3   means for managing leases on the objects;

4   means for communicating lease expiration data from the clients to the storage

5   server arrangement along with storage access requests, the lease expiration data

6   indicating a lease expiration time; and

7   means for conditionally providing access to the object at the storage server

8   arrangement if the lease expiration time is later than a current time.

1   12.   A system for managing access to objects by clients in a distributed file system,

2   comprising:

3   a meta-data server coupled to the clients, the meta-data server configured and

4   arranged to manage leases to the objects responsive to requests from the clients, and

5   transmit lease expiration data to the clients indicating lease expiration times; and

6   a storage server arrangement coupled to the clients, the storage server

7   arrangement configured and arranged to conditionally provide access to the objects in

8   response to access requests from the clients that include data indicating lease expiration

9   times, wherein access is provided in response to a request if the lease expiration time is

10   earlier than a current time.

1   13.   The system of claim 12, wherein the lease request includes an object identifier

2   and a requested lease duration.

1   14.   The system of claim 13, wherein the data indicating the lease expiration time

2   describes a time at which the lease began and a duration of the lease.

1   15.   The system of claim 14, wherein the meta-data server is further configured to

2   compute lease expiration times.